

## Formal Lab Report Guidelines Fall 2022

You will write the “Formal Lab Report” based the second part of the “Tape Lab”. It is worth 10% of your PHYS1225 lab mark.

The due time/date for the first try of the Formal Lab report is at the beginning of Lab #3, that is 12:30pm, Sept. 27<sup>th</sup>. It will be marked and return to you on Oct. 11<sup>th</sup> during Lab #4. If you would like to improve your mark, you can rewrite it and hand it in on Oct. 18<sup>th</sup>, before Lab #5. The better mark will be used if you choose to rewrite.

It is recommended that you print your Formal Lab report with a word processor and a printer. You may leave some spaces for diagrams/equations and hand-write those to save time. Or, you can hand-write the entire Formal Report. Make sure your handwriting is very clear and neat.

You are encouraged to read books or online material relating to your experiment, but you must give references if you use other people’s work. Use numbered superscripts for references and list all the references at the end of the report. You must not copy any work from any source. Write in your own words to report your own experiment. Each partner must hand in a different report, although the data is the same as the partner.

The purpose of the Formal Lab report is to learn how to write a paper or article for a scientific journal, to present your own discovery. Such a paper or article has a standard structure which includes (in order): title, author(s), abstract, introduction, method, results, conclusion, discussions, acknowledgment and references. Below are the detailed requirements for each section. You should also read the online sample Formal Lab report “Measuring  $\pi$  by Areas” (<http://langraphysics.com/1225formallabsample.pdf>).

### 1. TITLE AND AUTHOR(S)

Do not use “Electrostatic Interaction Part 2” to be your title. A title like “The number of Deficit Electrons on a Piece of Charge Tape” is fine although plain. Use your creativity to make your title interesting! Next are your name and your partner’s name, followed by your contact information, for which you can use “Physics Department, Langara College, 100 West 49th Ave., Vancouver, BC, Canada”.

### 2. ABSTRACT

The abstract gives a highly condensed (“abstracted”) version of your article. Often this is the only part of the paper that people read, so it should be concise and impressive. In length it should not exceed 1/3 of a page.

The abstract must answer the following: What was done? What was found?

Here is an example of an abstract for Part I of the “Tape Lab”. More abstract examples can be found at <http://langraphysics.com/1225formallababstractsamples.pdf>.

*We investigated the interactions between pieces of transparent tapes after ripping them off from the back of another piece of the same tape. We were able to create both positively and negatively charged tapes. The interactions between the tapes qualitatively followed the Coulomb’s Law.*

### 3. INTRODUCTION

The introduction should include:

- The background. What leads to your investigation? What has already been established? What questions are you trying to answer?
- The theory or the “physics” that your paper is based on. Explain how you are going to reach your goal, but leave the details to the “Method” section.

### 4. METHOD

This part should include the description of how the experiment was carried out. It should include:

- Apparatus: what you used in the experiment.
- Procedures. Emphasis on any special techniques or procedures that may be new to the readers. You may use figures and diagrams to illustrate your method.
- The detailed plan to calculate the number of deficit electrons from your data. Give equations when needed. Remember that when using the Coulomb’s law, you need to make two assumptions.

### 5. RESULTS

Your results should be presented in an orderly and concise format. Present your data with uncertainties first, either use sentences or data tables. Give the reasons if the uncertainties are unusually big or small. You will use some numbers from the handout, like the width and the mass of the tape, so list the handout as one of the references. Then present your results in sentences – the deflection angle, the Coulomb force, the charge on each tape and finally, the number of deficit electrons. You should not write equations again in this section. Make sure all your results have no more than 2 significant digits, and tell the reader that you will not calculate the uncertainties as you only want to do a rough estimate.

### 6. CONCLUSIONS

Briefly summarize and give the conclusions of your work.

### 7. DISCUSSIONS

Generally speaking, you should discuss: Does your result verify or contradict theory? How good is the agreement? How could the uncertainty be further reduced? Or, what are the possible causes for the disagreement? How could the theory be refined?

However, for this particular experiment, you may want to point out that the uncertainty is big, because we have made aggressive assumptions, and the distance measurements are rough. Also, charge is losing to our hands, to the water in air, so there is no accurate answer. However, when comparing to the number of surface molecules ( $4.2 \times 10^{16}$ ), one can conclude that only a small fraction of the surface molecules lose an electron, which is expected. So we do have a meaningful result.

### 8. ACKNOWLEDGEMENT

If you obtained any help during the experiment or the writing, be sure to give thanks in your paper.

### 9. REFERENCES

If you use someone else’s theory, methods or results, or if you use materials from a textbook, websites, or other publication, be sure to list the references at the end of in your paper.